Aircraft Operations
Pollution Prevention
Opportunity Assessment

of

Butts Army Air Field, Ft Carson Colorado
Buckley National Guard Base
Peterson Air Force Base
The United States Air Force Academy
Freemont County Airport

1-5 November 1999

Conducted By
The Air Force Center for Environmental Excellence, San Antonio TX
The Army Environmental Center Western Regional Environmental Office, Commerce City CO
The Corpus Christi Army Depot, Corpus Chrisit TX
The Colorado Department of Public Health and the Environment, Denver CO

STAFF ASSISTANCE VISIT INTRODUCTION

This Aircraft Operations Pollution Prevention Staff Assistance Visit (SAV) was conducted at the request of members of the Colorado Interagency Environmental Network. The Colorado Interagency Environmental Network is a group of pollution prevention and other environmental representatives from Colorado Department of Defense installations, EPA Region VIII, and the Colorado Department of Public Health and Environment. The purpose of the group is to discuss, share, and cross-feed pollution prevention and other environmental ideas and initiatives with one another, conduct cooperative projects, and to generally achieve the environmental mission while conserving scarce resources by working cooperatively together.

The SAV Team was tasked with performing walk-through pollution prevention opportunity assessments and to make on-the-spot recommendations for aircraft maintenance and operations facilities at four Colorado DoD installations: Fort Carson, Buckley ANGB, Peterson AFB and the United States Air Force Academy, and one civilian airport: The Fremont County Airport. The SAV Team consisted of personnel from the Air Force Center for Environmental Excellence (AFCEE), the Army Environmental Center Western Regional Environmental Office, the Corpus Christi Army Depot, and the Colorado Department of Public Health and Environment. The visit was conducted 1-4 November 1999 and an out-brief of preliminary findings was delivered to Colorado Pollution Prevention Network members on 5 November.

This Final Report summarizes the staff assistance visit and the recommendations presented at the SAV Out-brief. A short description of each opportunity identified is provided along with opportunities for partnering with other installations.

The SAV team member and installation POC lists are presented in Appendix A of this report.

SITE VISIT REPORT

The purpose of this staff assistance visit (SAV) is to provide on-site pollution prevention assistance for aircraft operations and maintenance facilities for four installations of the Colorado /DoD Interagency Environmental Network: Fort Carson, Buckley Air National Guard Base, Peterson AFB and the United States Air Force Academy as well as an additional civilian airfield, the Freemont Co Airport.

The Staff Assistance Team was a mixture of personnel from four different entities: Capt Stephen Novak (The Air Force Center for Environmental Excellence, San Antonio, Texas), Mr Tim Blume (The Army Environmental Center Western Regional Environmental Office), Mr Charles Gawenis (Corpus Christi Army Depot), and Mr. Kirk Mills (Colorado Department of Public Health and Environment). In addition representatives from each of the visited installations assisted during the assessment. Mr. Dan Rodriguez participated in the Buckley ANG Base visit.

The staff assistance visit took place 1-4 November 1999. Butts Army Airfield at Fort Carson was visited on Monday. Buckley Air National Guard Base was visited on Tuesday. Petersen AFB was visited on Wednesday and the USAF Academy and Freemont Co. Airfield were visited on Thursday. The site visit out-brief took place in Bldg 8110 at The Air Force Academy on Friday, 5 November. The following is a brief summary of the facilities visited and the types of operations they perform.

Fort Carson- Butts Army Airfield

The Airfield Operations and Maintenance organizations at Butts Army Airfield consist of three separate organizations; The Department of Logistics (DOL) Maintenance Area, The 571st and K Company. All three of these organizations are responsible for varying degrees of helicopter maintenance. A summary of their operations follows.

DOL Maintenance: Provides maintenance for Blackhawk and Huey helicopters up to the depot level. This shop performs operations on the entire airframe as well as shop level operations. DOL performs most of the component maintenance for the airfield and has the following shops; Electrical, Avionics, Prop and Rotor and Sheetmetal. The Point of Contact for this shop was Mr. Willard Stowell.

The 571st: Tests and replaces faulty helicopter component parts for Huey and Blackhawk helicopters and other general helicopter maintenance. Most components are repaired by the DOL Maintenance shop. The POC was SSgt Arnett.

K Company: This organization performs approximately four phase inspections per year on Blackhawk helicopters. Minor and major maintenance may be performed during these inspections.

The team walked through the entire area of the building discussing the details of the equipment or processes in each physical area. Personnel involved in individual processes were interviewed on specific details of their work and on the performance of equipment.

Because of the size and complexity of the building and the limited time available to perform the visit, not all operations were evaluated in detail. Specific observations and findings are found in Appendix B.

Buckley Air National Guard Base

Buckley ANG Base consists of both Air and Army National Guard aviation units. These are autonomous units which operate distinct maintenance and operations facilities.

Air National Guard Aircraft Maintenance: This unit maintains F-16 aircraft. Operations are performed both on the aircraft as a whole and in component repair and inspection shops, such as corrosion control, non-destructive inspection and Aerospace Ground Equipment. The point of contact for these operations was MSgt Greenwood.

Army National Guard Helicopter Maintenance: This unit maintains Huey and Blackhawk Helicopters. Operations include phase inspection, battery maintenance, sheetmetal and fabrication and component inspection and replacement.

The team spent one full day visiting these two maintenance units and identified a number of P2 initiatives already implemented by MSgt Greenwood of the Air National Guard. In addition to those already instituted the team noted several opportunities for partnerships on the base and additional P2 opportunities.

Due to time constraints not all operations were evaluated in detail, however specific recommendations as well as partnership opportunities are identified in Appendix C.

Peterson AFB

The team visited Peterson AFB to evaluate the Aero club and to visit the Air Force Reserve air craft maintenance facility.

The Aero Club is responsible for teaching student basic flight training. They are a FAA Approved flight-training center with 15 aircraft of various types. Aircraft are also available for rent by FAA licensed pilots. Club personnel perform both 50 and 100 hour inspections as well as routine and non-routine maintenance. Types of maintenance operations performed include; engine maintenance, parts cleaning, fluid changes, bearing inspection and packing, touch-up painting and battery maintenance.

The 302nd Air Force Reserve Aircraft Maintenance Facility maintains 12 C-130 aircraft. Our visit there was not part of the P2 assessment but merely to observe what types of P2 initiatives they had implemented, what successes they had and for potential partnership opportunities. The 302nd 's Isocronical inspection dock was especially proactive in implementing pollution prevention and cost saving measures.

The team spent a full day visiting these two organizations and identified a few P2 opportunities, many P2 successes and some partnership opportunities.

Specific findings and recommendations are found in detail in Appendix D.

United States Air Force Academy

At the United States Air Force Academy (USAFA) we visited numerous aircraft maintenance operations. These can be divided into Flight Training and Aero Club operations.

Flight Training maintenance involves numerous types of aircraft including gliders, motor gliders and Cessna T-3 aircraft. Maintenance includes; routine fluid changes, parts depainting, welding, battery maintenance, minor touch-up painting, and sheetmetal fabrication. In addition one glider per year is completely rebuilt from the frame up. This process involves; soldering, glue and adhesive usage and large-scale painting.

The Aero Club consists of 17 Cessna Aircraft. Aero club personnel perform minor maintenance such as fluid changes, engine maintenance and touch-up painting. Aero club personnel also wash aircraft.

The team identified a number of P2 initiatives already in place and a few P2 opportunities during their half-day visit. These initiatives and opportunities are identified in detail in Appendix E.

Freemont County Airport

The Freemont County airport is a municipal airfield located near Canon City approximately 80 miles SW of Colorado Springs. The airport consists of a variety of hangers and operations. The operations visited during this assessment were; Airport Maintenance and Fueling, Pro-Av, Peak Soaring and Maverick Air.

Airport Maintenance is responsible for all runway operations, aircraft fueling, tarmac pavement and markings and other types of general maintenance.

Pro-Av operates and aircraft maintenance and refurbishing hanger at the Freemont Co airport. Their operations include; engine rebuilding, aircraft interior refurbishing, fluid changes, aircraft painting and minor machining.

Peak Soaring maintains 5 gliders and 2 tow planes in it's hanger. They perform routine maintenance on their tow planes including general engine maintenance, flight system maintenance and fluid changes.

Maverick Air is developing a prototype jet aircraft for use as a private, kit built airplane. 95% of their parts and engines are built elsewhere however they do; use solvents for parts cleaning and fiberglass preparation, cut and shape fiberglass parts and perform jet engine runs-ups and maintenance.

It is important to note that although these organizations had no formal pollution prevention training they have identified and implemented many P2 initiatives. These, along with additional P2 Opportunities are summarized in Appendix F.

Staff Assistance Visit Outbrief

The Staff Assistance Visit Outbrief was performed on Friday, 5 November and included operation summaries for each individual installation. Specific P2 initiatives and opportunities were also identified as well as opportunities for partnerships with other installations.

Findings and Observations

Regardless of the installation it was obvious that workers were concerned about preventing waste and pollution. With or without formal training all shops recognized the need for such P2 initiatives such as secondary containment and material recycling. While some installations are more aggressive that others in identifying and implementing P2 initiatives all workcenters have something to offer in the P2 arena.

During the course of the assessment the team noted more than a few similarities among installations. A few pollution prevention opportunities were universal among all five facilities visited. These four common opportunities are discussed in detail below.

HAZMAT Management

Why do we place such an emphasis on the management of our hazardous materials? There are a number of reasons from protecting human health and the environments, improving customer support, reducing infrastructure requirements and last, but certainly not least saving money. In this era of increasing environmental program demands and decreasing budgets and effective hazardous materials management process can help significantly reduce the amount of money spent on waste sampling and identification and disposal. At many bases hazardous waste disposal and sampling and analysis programs account for in excess of 20% of the operations and services budget. For all these reasons managing your hazardous materials before they become waste is very important.

All effective and productive hazardous materials management programs have the following key elements in common; a mechanism to track who orders what material and how often, a materials approval process, an inspection function, an issue and distribution system and active support from the commander.

Tracking System: The single most important piece of the HAZMAT Management pie, the tracking system allows you to identify what material is used where, how much is used and by whom. A good tracking system keeps track of approved authorizations as well as quantities of material on hand. A tracking system, such as AF-EMIS, also greatly simplifies the environmental reporting process for EPCRA and other programs.

Material Approval Process: We know that we can never get rid of hazardous materials entirely in day to day operations but by following this four step approval process HAZMAT can be made safer to use and less hazardous to ourselves and our environment. The four-step approval process starts with the occupational health function. Occupational health approval adds two things to the process. First, they work with the user to possibly identify less hazardous materials to be used as substitutes and second they make sure that workers have the proper training and personal protective equipment (PPE) to use the product safely. This can result in reduced medical exam costs, illnesses and less money spent on PPE. Approval by environmental professionals ensure that the material is being used in a way that it is not harmful to the environment and that the workers are aware of proper disposal practices for the waste material. Adding a safety/fire department approval to the process ensures that the proper personnel know

what material is being used where in the event of an emergency. Finally the supply function ensures that the right material is being issued, to the right user in the right quantities.

Inspection Function: By examining in-shop chemical storage lockers on a regular basis you make certain that shop stock levels are held to a working stock and that shelf lives are being examined to prevent unnecessary disposal of unused material. By reducing the amount of material in a shop to a working stock level you not only are making that shop safer but also are reducing costs by supplying workers with only what they need. The effective inspection process is one that identifies potential problems in the shop before its too late. By minimizing stock volume, the likelihood that shelf life will be exceeded is reduced, and the likelihood that waste will be created will be reduced.

Issue and Distribution System: The tracking system also helps out in the issuing and distribution of materials. Tracking issued materials, along with periodic inspections, further reduces the amounts of materials issued and purchased.

Commander Support: Change is hard. Going from a system where a worker has all the material they will ever need in a room in their shop to one where workers manage their processes and on-hand materials is difficult. This is where a commander's directive can help. By mandating implementation of the process and tracking its progress the commander can emphasize the importance of the program. Rest assured that this emphasis will filter down to the shop level where personnel will take pride in how well they are managing their materials and how much money they are saving in purchasing and waste disposal.

Together all theses aspects make up an effective hazardous materials tracking program. Missing even one or two will place your program in jeopardy. For help on implementing a HAZMAT Management program or for questions contact Capt Novak.

Used Oil Management

Solvent Recovery

Fluorescent Bulb Management

The Colorado Department of Public Health and Environment (CDPHE) Hazardous Materials and Waste Management Division adopted amendments to the agency's universal waste regulations in July 1999 that allow hazardous waste lamps, including waste fluorescent light tubes, to be managed as a universal waste. This new development will give waste managers more flexibility regarding this difficult waste stream, which will hopefully be easier and less costly to implement, compared to the standard RCRA management requirements. Previously, waste tubes were considered a Resource Conservation and Recovery Act (RCRA) hazardous waste if they exhibited the characteristic of toxicity. If a Toxicity Characteristic Leaching Procedure (TCLP) analysis showed that the mercury concentration in the waste tubes was at least 0.2 ppm (mg/l), the waste would be considered a hazardous waste and managers were required to manage it as

such. Waste generators were required to periodically characterize waste fluorescent tubes to determine proper management requirements. This was expensive and difficult to implement. Potentially, anyone who handled waste tubes would be required to have hazardous waste management training.

The CDPHE has developed an updated Hazardous Waste Compliance Bulletin for Lighting Wastes (December 1999) that is included with this information which details the requirements that waste managers must meet. Generators are encouraged to read the bulletin and all applicable CDPHE regulations to understand all regulatory requirements. The amended waste management regulations (Colorado Hazardous Waste Regulations, Part 273) reduced management practices for mercury-containing lamps, including fluorescent light tubes. These universal waste regulations provide an alternative set of management standards that the generator may choose to follow in place of regulations in the Colorado Hazardous Waste Regulations Parts 260-268, 99, and 100. The amendments were primarily intended to encourage recycling. The benefits of managing this waste as a universal waste are that the wastes can be shipped without a hazardous waste manifest; the waste can be shipped by common carrier instead of by a hazardous waste transporter; the waste does not count toward the monthly total of hazardous waste in determining generator category; there are reduced notification and record keeping requirements; and the storage time limits are less restrictive. Requirements for universal waste transporters are found in Colorado Hazardous Waste Regulations Part 273 Subpart D.

The Colorado universal waste regulations that apply to mercury-containing lamps are essentially identical to the EPA regulations, except that they allow generators to crush waste-mercury containing lamps under certain circumstances, using approved methods and equipment. The Colorado requirements for crushing lamps can be found in Parts 273.13 and 273.33.

Small quantity handlers of universal waste are not required to notify CDPHE of their universal waste management activities. However, large quantity handlers of universal waste are required to notify the agency or their universal waste management activities. This is accomplished by obtaining an EPA Identification Number for these activities, using EPA form 8700-12. This must be done even if the facility has previously given notification and received an EPA identification number for its hazardous waste activities.

For more information and for answers to specific questions, contact the CDPHE's Customer Technical Assistance line at (303) 692-3320 or toll free (888) 569-1831 extension 3320. The Internet Web site address where the compliance bulletin may be found is http://www.cdphe.state.co.us/hm/guiddocs.html.
The CDPHE, Hazardous Materials and Waste Management Division's Internet Web site address, including access to waste management regulations, is http://www.cdphe.state.co.us/hm/hmhom/html.

Alternative Fluorescent Tubes

Switching to low mercury fluorescent tubes is an attractive option to most installations. The three manufacturers of the new tubes, Phillips, Sylvania, and General Electric, report that the "green" tubes can be disposed of by normal trash disposal methods. It is also reported that the

"green" tubes last up to 20 percent longer than traditional tubes while requiring less energy. The cost of the low mercury version is very close to that of traditional tubes. By using "green" fluorescent lighting, hazardous waste is minimized, energy is saved, and the life cycle cost is decreased.

Rules and regulations vary, so it is important to coordinate the implementation with installation environmental personnel and local regulators. One option for more information is to contact the U.S. Army Environmental Center Technology Transfer Hotline at t2hotline@aec.apgea.army.mil. To order low mercury bulbs, you can contact the Defense Logistics Agency Lighting Team at http://www.dscp.dla.mil/gi/general/light1.htm or call 1-800-DLA-BULB. You may also contact the EPA Green Lights Program at 1-888-STAR-YES.

Used Tires

All installations produce a variety of used tires for disposal. If tires can not be re-treaded there are still a number of options for them besides disposal in a landfill. For instance…

Whole tires can be used as building materials, to control erosion as crash barricades along roads and training areas and as firing range backstops.
Shredded tires (Tires shredded into 8"-18" segments) can be used to; reinforce soil to prevent erosion, line sanitary landfills, fire cement kilns and in the paper milling process.
Crumbed Tires (Tires ground into small particles) can be used as playground cover, road and asphalt patch covers, and recycled into building materials such as lumber and roofing shingles.

While one operation alone may not produce enough tires to warrant the purchase of a shredder many organizations, or installations, can work together to purchase the equipment and provide the market for re-used tires.

Importance of partnering

Lack of knowledge, funding or experience is no longer acceptable impediments to developing successful pollution prevention programs. Statewide partnerships such as the Colorado/DoD Interagency Environmental Network and assistance visits such as this one and the previous vehicle maintenance and recycling staff assistance visits are excellent starting points for sharing information. In this era of shrinking budgets and environmental funding it is important to realize that often times you can implement a expensive initiative more easily and cheaply by partnering with another organization. Joining together to achieve economies of scale is a good way of reducing costs while expanding the use of a pollution prevention initiative.

Training is another area where partnering can work wonders. Simply inviting other organizations to base training courses will not only lead to the training of more people but can lead to constructive dialog at the shop level between installations. Site visits to organizations that are doing good P2 projects provides the host with not only an opportunity to "show off" but a chance to foster good relations with a neighboring base. Inviting members of the civilian community can not only increase baseline P2 knowledge but it can be a great way to show the general community of the benefits a military installation can give to an area. It's great public relations.

Take a close look at the following specific recommendations. You may find inspiration in what someone else is doing or what has been recommended for another organization.

Specific findings for each installation can be found in the following Appendices

- Appendix B – Ft Carson, Butts Army Airfield
- Appendix C – Buckley ANGB
- Appendix D – Peterson AFB
- Appendix E – Air Force Academy
- Appendix F – Freemont County Airport

Appendix A
Contacts

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SAME

Appendix B
Fort Carson

A. Observations:

Shop	Initiative Title	Description
DOL	Aerosol can recycling	All used aerosol cans are collected and sent en masse to the recycling center for recycling
ALL	Floor Cleaning	All organizations use zamboni type floor cleaners for routine floor cleaning, waste water is collected and has been sampled prior to disposal into the sanitary sewer.
DOL	Scrap Metal Recycling	All types of scrap metal (cast iron, aluminum, steel, etc.) are collected in dumpsters outside the hanger and turned into DRMO to be recycled.
DOL	Sanding and Media Blasting for Paint Removal	The Sheetmetal shop uses a media blasting booth with HEPA filters to strip the paint off of small parts. This method of paint removal replaces the old chemical stripping method. Instead of disposing of large volumes of thinners/strippers, you dispose of the blast media dust and paint dust.
ALL	P2 Program	Personnel are aware of what P2 is and what it can do for them.
ALL	Recycling of Office Paper, Cardboard, and Aluminum Cans	All operations utilize recycling bins and participate in the installation's recycling program
DOL, K Co	Laundering of Shop Rags	Vehicle Maintenance sends their shop towels to another organization on post to be laundered instead of being landfilled. Rags are exchanged monthly on a one-for-one basis.
DOL, 571st	Crushing of Oil Filters Prior to Disposal	These shops crush oil filters before disposing of them to reduce the volume of waste and to collect the used oil for potential re-refining.

B. P2 Opportunities:

Shop	Opportunity	Description
DOL	Solder Replacement	Replace lead-core solder with rosin core solder. This reduces potentially harmful personal exposures and environmental releases
DOL	Secondary Containment	Install secondary containment to collect drips, and potential spills, from the simple green drum in the sheetmetal shop.
DOL	HEPA Filters	Using High Efficiency Particulate Air (HEPA) filters on

	for Blasting Booth	the blasting booth will reduce visible dust emissions and provide for a cleaner work area.
ALL	Used Chemical Pads	Some pads contaminated with limited amounts of material can be composted. Ft Carson had a composting facility and this may be an option for these pads in lieu of disposal.
ALL	HAZMAT Management	These shops can greatly benefit by participating in the installation HAZMAT management program. See the HAZMAT Management section under Findings and Observations for more details.
ALL	Used Oil Management	Sending used oil to be burned for energy recovery is not true recycling. It is really treatment with a benefit. Fort Carson is currently paying a contractor to pick up and burn their used oil. Companies such as Safety-Kleen are setting up systems where you buy a volume of re-refined oil and Safety-Kleen will pick up the same volume of used oil and re-refine it at no cost.
ALL	Reduce the Number of Part Washing Solvent Sinks	Each month Safety-Kleen changes out about between 30 and 50 gallons of solvent from each tank. To reduce this volume, all maintenance shops should determine exactly what parts must be cleaned with solvent. Parts that do not need to be cleaned with solvent should be cleaned with aqueous based fluid in small sinks. Second, they should determine how many Safety-Kleen sinks are needed to clean the parts identified in step one. It is also not necessary to have a sink at each maintenance bay or in each small component shop. Many shops or bays can share the same sink. Finally unneeded sinks should be removed, solvent deliveries/pickups cancelled, and the remaining sinks shared. Personnel should also examine using Safety Kleen 150 or "Green" solvent. This solvent is purer and lasts longer due to the built in cyclonic filter in the system.
ALL	Purchase Re-refined Oil	This affirmative procurement initiative helps close the loop on oil recycling. Purchasing re-refined oil eliminates the need for buying virgin oil.
ALL	Install Filters on Solvent Sinks	Recommend installing filtration units on the numerous red Safety-Kleen solvent sinks. Filtration units help prolong the life of the solvent which would require changing it less often. Recommend adjusting the current Safety-Kleen contract so that 50 gallons of solvent is not picked up from every sink each month whether it needed changing or not. Over a span of a year, this is an incredible amount of solvent being sent off-site as hazardous waste. Change the contract so that Safety-Kleen only picks up the solvent when called (when it

		needs to be changed).
ALL	Recycle Oil Filters as Scrap Metal	Currently Fort Carson is crushing oil filters and disposing them as solid waste. Many installations across the country are sending their oil filters to be recycled as scrap metal.
ALL	Red Rag Contract	Currently Aircraft Maintenance shop rags are collected and sent elsewhere on post to be laundered. Recommend using a red rag contract through a local off-site vendor. That way, Fort Carson can eliminate the on-site generation and treatment of this wastewater in their on-base water treatment plant. Once an initial set of red rags are purchased, they can be laundered for just pennies a rag. Buckley ANGB and the Air Force Academy are currently laundering their rags for about 7 to 8 cents per rag. Rags are exchanged one-for-one on a weekly, biweekly, or monthly basis.
ALL	Use Reusable Absorbent Pads for Spill Cleanup	Use absorbent pads for spill cleanup instead of absorbent clay (kitty litter). To absorb the same amount of spilled fluid, it takes a lighter weight of absorbent pads to clean up the spill than absorbent clay. Plus, an absorbent pad wringer can be purchased to squeeze the fluids out of the pad so that the pad can then be reused. There are many varieties of absorbent pads. Some are designed for oil; some are designed for aqueous solutions; some are multi-purpose; and there are some designed to perform a specific job (such as skimming oil off of a pool of antifreeze/ water). Some absorbent pads are also made from recycled content paper or plastic.
DOL	Use Mini-max Steam Cleaner System for Circuit Board and Small Parts Cleaning	Currently the DOL Electronics Shop is using aerosol spray solvents to clean circuit boards and other electronic components. Recommend using a small component steam cleaning system to clean these components. The system consists of a wand that shoots a hot water/steam stream out of a nozzle. This system may also be ideal for some of the small parts cleaning in other operations. Buckley ANG Base is successfully using 4 of these cleaning systems for a wide variety of applications.
571st	Replace Maintenance Batteries with Maintenance-Free Batteries	Currently the 571st is draining and replacing electrolyte in many of their batteries. This task requires Fort Carson to purchase and dispose of the sulfuric acid electrolyte as a hazardous waste along with requirements to provide adequate battery and electrolyte storage, ventilation, secondary containment, and personal protection for workers, etc. Vehicle Maintenance could replace batteries that must be maintained with commercial off-the-shelf sealed lead acid batteries and develop a one-for-

		one exchange program. Eventually, the need for a battery shop and all of the environmental headaches that go with it could be eliminated.
ALL	Reuse of Absorbent Clay Before Disposal	At all shops, absorbent clay (kitty litter) is used for spill cleanup. If clay absorbent must be used, it is best to use a 3 container system (new, used, spent) to ensure maximum use before disposal. After use, the clay is placed in the used bin. The used bin clay is reused until it is spent (completely saturated). Only then is it placed in the spent bin. A screen on top of the used bin to help separate the spent clay from clay that still has life.
ALL	Use Gel Cell Type Batteries	Where applicable, use gel cell type batteries in lieu of standard maintenance lead acid and sealed (maintenance-free) lead acid batteries. These batteries are filled with a gel substance that prevents leaking of battery acid if the outside casing breaks. They can be mounted at any angle in the vehicle and have been shown to produce more cold cranking amps than regular batteries. Although these batteries are more expensive, they typically last up to twice as long a standard sealed lead acid battery. This would reduce the amount (weight) of batteries generated at Fort Carson each year.

C. Partnership Opportunities

Ft Carson is a large installation and has already shown P2 leadership by starting a rag recycling and HAZMAT management program. Many of the areas identified above can also be implemented in conjunction with existing operations, such as vehicle maintenance.

Due to the proximity of Buckley ANGB and the already cooperative nature of their operations P2 is a natural arena for sharing P2 information, training and ideas. The Colorado Interagency Environmental Network is an excellent forum in which to do this. In addition the Corpus Christi Army Depot has implemented a number of P2 initiatives which can be useful in helicopter maintenance facilities. Contact Mr Charles Gawenis for more information.

Appendix C
Buckley ANGB

A. Observations:

Shop	Initiative Title	Description
Army	Powerwasher	The Army units operate a powerwasher for cleaning aircraft which can use multiple types of fuel including; gasoline, diesel and aircraft fuels. This allows them to recover aircraft fuel prior to maintenance and use the fuel instead of disposing of it.
Air Force	Fuels Reclamation	Residual fuels in the F-16 fueling pods are reclaimed and turned over to transportation for use in alternatively fueled vehicles.
Air Force	Vacuum Sanding	Vacuum sanders are used to collect sanding dust before they become a respiratory and airborne dust hazard. This reduces medical examination and clean-up requirements.
Air Force	Alodine re-use	Alodine is separated into its own waste stream and recycled through a contractor.
Air Force	Alternate color priming	By priming the aircraft with an alternate color it is easier to identify during stripping operations, when the primer coat is reached. This prevents the need for solvent use to clean bare metal and the use of additional primer.
Air Force	Roller painting	Leading edges of the aircraft are painted with a roller. This reduces air emissions and PPE requirements while providing a surface, which is thicker and needs to be painted less frequently.
Air Force	Silver Recovery program	By processing both the NDI and hospital silver containing wastes this shop helps reduce the amount of waste sent to the sanitary sewer and reduced infrastructure requirements by only needing one system for the installation. This helps the base meet it's NPDES permit requirements.

B. P2 Opportunities:

Shop	Opportunity	Description
Army	Test wash water effluent	Waste water from aircraft washing in the hangers need to be collected and tested for oils and greases as well as other NPDES pollutants because it does not pass through an oil/water separator prior to entering the sanitary sewer.
Army	Can Crusher	Crushing aerosol and oilcans as well as fuel/oil filters after they have been drained will reduce the volume of waste being disposed of or recycled.
Army	HAZMAT	This shop can greatly benefit by participating in the

	Management	installation HAZMAT management program. See the HAZMAT Management section under Findings and Observations for more details.
Army	Recycle used oil filters	Oil filters should be drained and the waste oil collected and sold for re-refining.
Army	Used oil Management	Oil filters should be drained and the waste oil collected and sold for re-refining.
Army	Solvent management	The Army National Guard had a number of Safety Kleen Red tanks that could be consolidated. Using the Safety Kleen "Green", a purer solvent can also increase the life of your cleaning solvent and reduce the number of solvent changes made per year. "Green" solvent machines have a built-in cyclonic filter and is less likely to need to be disposed of as hazardous waste. For more information contact MSgt Greenwood of the ANG.
Army	Fluorescent Bulbs	Crushing these bulbs may be allowed in conjunction with the new Colorado rules summarized in the body of this report. Crushing them will reduce volume and thus disposal costs. If specialized equipment is required it may be possible to partner with the Air National Guard and other base operations.
Army	Water in fuel pit	The fuel overflow catch basin that collect the fuel spilled from fueling trucks contains standing water. In the event of a spill this standing water may be determined to be contaminated and therefore increase the cost of collecting and disposing of the spilled fuel.
Army	Recycling NiCad batteries	The Rechargeable Battery Recycling Corporation (RBRC) has a number of options for recycling NiCad batteries. For more information visit their website at www.rbrc.com or see the materials attached to this report.
ALL	Purchase Re-refined Oil	This affirmative procurement initiative helps close the loop on oil recycling. Purchasing re-refined oil eliminates the need for buying virgin oil.
Army/ Air Force	Floor Cleaning	White floors, while they look nice also require a lot more attention and cleaning. The next time you are considering painting your floors choose a light gray color, which will still make the hanger appear brighter and require less frequent cleaning.
Air Force	Product Substitution	Currently the corrosion control is using MEK, in small amounts, for cleaning paint guns. Consider using Inland Technologies 921 solvent for paint gun cleaning. The Inland solvent does not contain MEK and is considered less hazardous.

C. Partnership Opportunities: Because of their proximity to one another these two units have a lot of potential areas in which they can partner to save money and reduce waste.

- Purchasing and use of used filter and aerosol can crushers
- NiCad battery recycling (See accompanying information on recycling opportunities in your area)
- Education and training
- Solvent recycling
- Used oil management
- Use residual fuel from the F-16 wing tanks to power the Army powerwasher
- Training, both awareness and technical level. Ft Carson personnel can also benefit from joint training with their guard brethren.
- Site visits. The Air National Guard has identified a lot of P2 opportunities and has implemented them very effectively. Partnering with the Army National Guard will help them to see the potential savings and benefits of active P2 programs.

Due to the proximity of Ft Carson and the already cooperative nature of their operations P2 is a natural arena for sharing P2 information, training and ideas. The Colorado Interagency Environmental Network is an excellent forum in which to do this.
In addition the Corpus Christi Army Depot has implemented a number of P2 initiatives which can be useful in helicopter maintenance facilities. Contact Mr Charles Gawenis for more information.

Appendix D
Peterson AFB

A. Observations:

Shop	Initiative Title	Description
Aero-Club	Recycling of Office Paper, Cardboard, and Aluminum Cans	This operation utilizes recycling bins and participates in the installation's recycling program
Aero-Club	Red Rag contract	This organization currently uses a off-site local contractor for managing their used rags. This way the installation can eliminate on-site treatment and waste generation due to laundering their own rags. Once an initial set of rags has been purchased costs to clean and maintain these rags are minimal.
Aero-club	Steam Cleaning Aircraft	As a FAA training center the Peterson AFB Aero-Club is allowed to steam-clean their aircraft. This results in less solvent usage for aircraft cleaning.
Aero-Club	Drip Pans	Maintenance personnel currently utilize drip pans and absorbent pads to capture engine drippings before they fall on the floor. This reduces the frequency and need for floor cleaning thus saving water and reducing discharges to the wastewater treatment plant.
302nd	Aircraft decals	To minimize paint usage and associated costs (product, occupational health, preparation time, solvent usage etc) the 302nd manufactures a majority of the C-130 aircraft markings with a decal maker. Decals are then applied to the aircraft without the use of adhesives or solvents.
302nd	Rolling bulk distribution	A large rolling cart, with an integral secondary containment basin, is used to move the oils, greases and other fluids necessary for an isocronical inspection.
302nd	Infrared heating	The main Iso hanger has been retrofitted with infrared heating elements that can provide greater heat at a lower cost than traditional forced air heating units.
302nd	Drip Pans	Each maintenance rack is equipped with it's own drip pan to capture fluid releases during the engine maintenance process. These drip pans can then funnel these waste fluids into a can for eventual disposition into the waste oil containers. This prevents drips from collecting on the floors and thus can decrease the need for floor cleanings.
302nd	Use of recycled materials	Personnel have purchased wheel chocks that are manufactured from recycled plastics. By purchasing recycled materials they are also increasing the market for their own recyclables.

302nd	Floor washing machines	Both the Iso hanger and the engine maintenance shop utilize "Floor Zambonis" to clean the floors. These self-contained floor-cleaning units collect their own wastewater for analysis and eventual disposal thus reducing the discharge to the sanitary sewer system.
302nd	Aircraft paint scheme modifications	After noting that they were spending a lot of time and cleaning materials cleaning the C130 engine exhaust tract they determined that by increasing the width of the existing exhaust track, painted black, they would reduce their cleaning time and use of cleaning materials thus saving money.

B. P2 Opportunities:

Shop	Opportunity	Description
Aero-Club	HAZMAT Management	This shop can greatly benefit by participating in the installation HAZMAT management program. See the HAZMAT Management section under Findings and Observations for more details.
Aero-Club	Used Oil Management	Oil filters should be drained and the waste oil collected and sold for re-refining.
Aero-Club	Solvent recycling	The Aero Club had a number of Safety Kleen Red tanks that could be consolidated. Using the Safety Kleen "Green", a purer solvent can also increase the life of your cleaning solvent and reduce the number of solvent changes made per year. "Green" solvent machines have a built-in cyclonic filter and is less likely to need to be disposed of as hazardous waste.
Aero-Club	Floor cleaning	The Aero Club should look into utilizing P2 funds from base CEV to purchase a floor-cleaning machine. These 'Floor Zamboni" type machines collect and recycle wash water to reduce unnecessary discharges down the sanitary sewer.
Aero-Club	Install Filters on Solvent Sinks	Recommend installing filtration units on the numerous red Safety-Kleen solvent sinks. Filtration units help prolong the life of the solvent which would require changing it less often. Recommend adjusting the current Safety-Kleen contract so that 50 gallons of solvent is not picked up from every sink each month whether it needed changing or not. Over a span of a year, this is an incredible amount of solvent being sent off-site as hazardous waste. Change the contract so that Safety-Kleen only picks up the solvent when called (when it needs to be changed).
Aero Club	Mobil bulk Oil Distribution	By adopting a system like the one used by glider maintenance at USAFA the Aero Club can purchase oil in

		bulk and transfer it safely and efficiently from can to aircraft eliminating the need for a secondary transfer container.
302nd	Publicity	The isochroical inspection dock and the painting and decal modifications you have made on the C-130 aircraft are excellent examples of putting P2 into practice and every effort should be made to publicize the work that has been done.
Aero-Club	Use of Decals	Using self-adhesive decals instead of paints for aircraft markings is an easier and more environmental friendly way to coat aircraft. By eliminating paint you also eliminate the need for personal protective equipment, solvent usage and hazardous materials storage. The 302nd has a decal machine that it may be possible to use. If not Aerographics Incorporated (800-336-9633), Sun Art Decal Inc (800-835-5551), Aviongraphics (942-472-0438) and Goodner Aircraft Painting Inc (501-394-4709) are all excellent sources of aircraft decals and decal machinery.
ALL	Purchase Re-refined Oil	This affirmative procurement initiative helps close the loop on oil recycling. Purchasing re-refined oil eliminates the need for buying virgin oil.
Aero-Club	Chemical Lockers	The Aero Club needs to reduce the amount of hazardous materials they have on-hand. An effective HAZMAT Management program can help to reduce on-hand stock as well as identify proper storage procedures.
Aero-Club	Substitute chromate primers	Where applicable, use gel cell type batteries in lieu of standard maintenance lead acid and sealed (maintenance-free) lead acid batteries. These batteries are filled with a gel substance that prevents leaking of battery acid if the outside casing breaks. They can be mounted at any angle in the vehicle and have been shown to produce more cold cranking amps than regular batteries. Although these batteries are more expensive, they typically last up to twice as long a standard sealed lead acid battery. This would reduce the amount (weight) of batteries generated as well as the safety concerns for storage and recharging lead acid batteries.

C. Partnership Opportunities:

The Aero Club was unaware of what support the base environmental flight could offer. P2 money for purchasing equipment, educational material and training classes are all available through the base environmental flight. One good way is to have walk throughs, like we did, periodically. The environmental Flight should partner with Bioenvironmental Engineering to perform site visits during annual visits to look for P2 opportunities.

The 302nd should publicize their P2 initiatives both on the base and through reserve and active duty channels. The WY Air National Guard has similar operations and could benefit from the exchange of ideas and a site visit. The Aero club could utilize the decal machine to manufacturer markings for their own aircraft. The Aero Club and 302nd could also partner in used oil management to consolidate their used oil and create new opportunities for its reuse/reclamation due to the larger volume.

Appendix E
Air Force Academy

A. Observations:

Shop	Initiative Title	Description
Glider & T-3 Maint	Red Rag Service	The glider and T-3 maintenance activities currently have a rag-laundering contract. This reduces solid waste by laundering, instead of disposing of, used rags.
Glider Maint	Mobil bulk Oil Distribution	This shop uses a wheeled oil container with a built in dispensing hose to transfer oils directly into aircraft components.
T-3 Maint	Waste Oil Collection System	All waste oil is collected via access ports in the hangers then pumped to a centrally located collection tank. Both the tank and the underground piping are complete with a leak detection system. This prevents potential spills from the transferring of bulk used oil to the collection tank.
T-3 Maint	Use of outdated Chemicals	Maintenance personnel use old and out of spec chemicals as training aids during routine shop training. This use helps meet training requirements as well as precludes the use of new material and the disposal of old materials as waste.
Aero Club	Wing tank Venting Collection	Fuel venting from wing tanks is collected with the help of a simple hose and fuel can. The hose is positioned so that all venting fuel is transferred directly to the tank. There is no spillage on the pavement because of this system. The reclaimed fuel is then used in other equipment such as the tractor.
Aero Club	Parts Washer	Using the inland parts washer with break free solvent and a filtration system this shop greatly extends the life of their cleaning solvents and only has to replace their filters every three years.
Aero Club	Floor Washing	Aircraft are washed inside then the excess wash water is also used to clean the floors of the hanger.

B. P2 Opportunities:

Shop	Opportunity	Description
Glider Maint	HEPA Filters for Blasting Booth	Using High Efficiency Particulate Air (HEPA) filters on the blasting booth will reduce visible dust emissions and provide for a cleaner work area.
Glider Maint	Floor Drain in Painting Booth	There is a floor drain located in the large paint booth. This drain should be covered whenever painting, sanding or cleaning operations are occurring in the booth. Better yet the drain should be permanently capped to prevent

		accidental release to the environment.
Glider Maint	Pre-filters	Installing pre-filters on the large paint booth will increase the life of the filters thereby decreasing solid waste and procurement costs.
ALL	HAZMAT Management	All shops can benefit from a strong hazardous material management program. Participation with the installation HAZMAT pharmacy program should be included in the next maintenance contract. See the HAZMAT Management section under Findings and Observations for more details.
Glider Maint	Refillable Air Sprayers	Consider using refillable paint sprayers instead of individual aerosol cans. These paint sprayers are self contained and pressurized with air. Using them will decrease spray can procurement and solid waste disposal costs.
ALL	Purchase Re-refined Oil	This affirmative procurement initiative helps close the loop on oil recycling. Purchasing re-refined oil eliminates the need for buying virgin oil.
ALL	Oil Filter/can Drainage	Oil filters should be left for a few days to drain into a waste oil container. Used filters should then be crushed to reduce volume and recycled if possible.
ALL	Used Oil Management	Disposal is rarely the best option for the disposition of used oil. Used oil can often be re-refined or used as asphalt or other plant feed stocks or for energy reclamation.
T-3 Maint	Vacuum or Wet Sanding for Fiberglass	To help control the dust generated by sanding fiberglass wet sanding should be tried. This will reduce airborne particulates as well as PPE requirements and clean up.
ALL	Use of Decals	Using self-adhesive decals instead of paints for aircraft markings is an easier and more environmental friendly way to coat aircraft. By eliminating paint you also eliminate the need for personal protective equipment, solvent usage and hazardous materials storage. Aerographics Incorporated (800-336-9633), Sun Art Decal Inc (800-835-5551), Aviongraphics (942-472-0438) and Goodner Aircraft Painting Inc (501-394-4709) are all excellent sources of aircraft decals and decal machinery.
Aero Club	Mobil bulk Oil Distribution	By adopting a system like the one used by glider maintenance the shop can purchase oil in bulk and transfer it safely and efficiently from can to aircraft eliminating the need for a secondary transfer container.
Aero Club	Battery Containment	Because this shop must use lead-acid batteries we recommend that they install secondary containment around the battery recharge area to prevent the potential release of acid into the floor drain in the event of a spill.

C. Partnership Opportunities

These three shops are separated by the flightline but they could still benefit from working together. Consolidating used oil and red rag contracts have the potential to save money

and create new markets for an increased amount of used oil. Also, all employees can benefit from P2 training. Also, the 302nd located at Peterson AFB uses a decal machine to manufacture 90% of their aircraft markings. Asking to use their system, but supplying your own decal stock, may preclude spending money for a decal machine.

Appendix F
Freemont County Airport

A. Observations:

Shop	Initiative Title	Description
Apt. Maint	Fuels Management	Airfield manager is aware of the limitations of in-ground tanks and has already installed one above ground fuel tank with all required environmental controls and is making arrangements to remove a second tank.
Apt. Maint	Red Rag Service	The general aviation and airfield maintenance currently has a rag laundering contract. This reduces solid waste by laundering, instead of disposing of, used rags.
Apt. Maint	Used Oil Recycling	Used oil is currently collected in a large drum in the general aviation hanger. This used oil is then collected by a local asphalt company and used as feed stock.
Apt. Maint	Secondary Containment	Bulk oil distribution utilizes a feed trough for secondary containment. This is an excellent example of effective pollution prevention measures not having to cost a lot of money.
Pro Av	Floor coating	The hanger floor is painted with a light gray, durable floor paint. By using light gray the floor still reflects light but does not appear as dirty therefore reducing the frequency of floor washing thus reducing water and soap usage.

B. P2 Opportunities:

Shop	Opportunity	Description
Apt. Maint	Decals for flightline Markings	To reduce the amount of paint used for airfield markings and to reduce potential for spillage during storage of this paint we recommend looking into using pavement stickers for ramp markings.
ALL	HAZMAT Storage Lockers	All operations would benefit from the use of HAZMAT Storage lockers. These storage lockers provide secure, safe HAZMAT storage with built in secondary containment. These lockers are available from a variety of manufacturers in a variety of sizes and price ranges.
Apt. Maint	Palletize road joint sealer	The road joint sealer should be palletized and place within secondary containment if possible. Palletizing this material would make it easier to determine if and when a spill has occurred and allow quicker response actions.
ALL	Secure bulk storage and distribution	The bulk oil, fuel and waste oil storage areas should be secured with a lock of some sort. Locking these potential spill points will prevent accidental, or malicious, release of

	areas	fuel or oil.
Apt. Maint	Relocate fuel storage tank	To capture any spills from this tank after a fueling operation the distribution nozzle should be located over the secondary containment. Simply moving the fuel tank to the back of the feed trough will prevent any small drips from contaminating the ground.
Pro- Av	Cover Floor Drain	The floor drain in the center of the hanger drains to an unspecified location. Until this location is determined we recommend covering the floor drain to prevent any accidental release from getting into the environment.
ALL	Solvent Recycling	All activities can benefit from cooperating and recycling their solvents.
ALL	Red Rag Service	All activities can benefit from utilizing a rag reuse contractor. This way the organizations can reduce their hazardous and solid wastes to save money. Once an initial set of rags has been purchased costs to clean and maintain these rags are minimal.
ALL	Purchase Re-refined Oil	This affirmative procurement initiative helps close the loop on oil recycling. Purchasing re-refined oil eliminates the need for buying virgin oil.
ALL	Used Oil Filters	All organizations should drain their used oil filters into a waste oil collection drum then crush and recycle the drained oil filters. Reclaimed oil can, in many cases be sold for re-refining or use as feed stocks. By recycling the used filters solid waste disposal costs can be reduced.
ALL	Used Tires	Many locations are now offering alternatives to disposal of used tires. Consult your local tire dealer for more details.
Peak Soaring	Use of Drip Pans	By using drip pans instead of absorbant pads to collect engine drippings you do a number of things. First you reduce the amount of money spent on sorbant pads, second you save money by not purchasing the pads, third you reduce the volume and weight of you solid waste disposal by not disposing of the used pads and finally you have the potential to sell the reclaimed oil.
Pro-Av	Use of Decals	Using self-adhesive decals instead of paints for aircraft markings is an easier and more environmental friendly way to coat aircraft. By eliminating paint you also eliminate the need for personal protective equipment, solvent usage and hazardous materials storage. Aerographics Incorporated (800-336-9633), Sun Art Decal Inc (800-835-5551), Aviongraphics (942-472-0438) and Goodner Aircraft Painting Inc (501-394-4709) are all excellent sources of aircraft decals and decal machinery.
Maverick Air	HEPA Filters for Blasting Booth	Using High Efficiency Particulate Air (HEPA) filters on the blasting booth will reduce visible dust emissions and provide for a cleaner work area.

C. Partnership Opportunities:

The small size of the individual operations ate Freemont County Airport make this the ideal location for partnering. All the previously identified initiatives marked with an "ALL" are excellent potential partnering areas. Working together to collect used oil for instance will increase the amount of oil available for reuse or resale thus making the operation more attractive for oil recycling or re-refining. Joining together for the purchase of red rags can also help reduce costs due to economies of scale. Finally the military is an excellent source of ideas for pollution prevention and surplus equipment. Many times surplus HAZMAT storage lockers can be purchased at a discount from the military Defense Reutilization Marketing Office (DRMO). In addition the similarity of your operations with USAFA, for gliders, and the various aero clubs provide an excellent opportunity for sharing ideas.